

TA 14

## IMPLEMENTING A CARE LEVEL AND TIMELINESS REVIEW PROGRAM

March 1978

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

HEALTH CARE FINANCING ADMINISTRATION  
HEALTH STANDARDS AND QUALITY BUREAU

MANUALS

RA

399

A3

T-14

1978



RA  
399  
,43  
TA-14  
1978

# MEMORANDUM

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE  
HEALTH CARE FINANCING ADMINISTRATION  
HEALTH STANDARDS AND QUALITY BUREAU  
OFFICE OF PROFESSIONAL STANDARDS REVIEW ORGANIZATIONS

TO : Planning and Conditional PSROs and Support  
Center Organizations; Statewide Councils;  
Regional PSRO Project Officers

DATE: MAR 21 1978

Technical Assistance  
Document No. 14

FROM : Director

SUBJECT: Implementing a Care Level and Timeliness Review Program

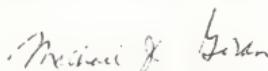
This technical assistance document describes a methodology — Care Level and Timeliness Review (CLTR) developed by the consulting firm McKinsey and Company as a result of their previous work with the Veterans' Administration. Over the last year and a half, CLTR has been tested under HSQB contract number 240-76-0071 in three hospitals under PSRO review in the Delmarva and Prince George's Foundations for Medical Care, Inc. An overview of the CLTR process and the experience of the test sites was presented to the National Professional Standards Review Council at their March meeting. The Council encouraged its further implementation in other PSROs and asked for feedback. Accordingly, we encourage PSROs to apply CLTR and provide us with comments regarding its usefulness in their area.

CLTR follows the generic approach of the Medical Care Evaluation (MCE) study in order to assess admission and continued stay appropriateness and the timeliness of the care provided to hospitalized patients. It identifies that portion of total inpatient days during the review period that could have been avoided if the hospital's admission, discharge, and treatment processes had worked as expected. The analysis is based on a retrospective review of a 200 patient record sample chosen randomly from all hospital discharges during the review period. Each record is reviewed against two types of criteria: a) PSRO concurrent review screening criteria to determine whether days of stay are avoidable due to inappropriate admissions and continued stays and b) "turnaround time" criteria to determine whether the timeliness with which care is provided impacts on length of stay. In setting the latter criteria, turnaround times are developed for those diagnostic/therapeutic actions and hospital services which, if not performed in a timely fashion, could influence length of stay. The results of this analysis are extrapolated to the hospital as a whole to identify the extent and apparent causes of avoidable days of stay within the hospital. These results likely will suggest problem areas requiring further study in order to pinpoint the underlying causes and to develop feasible improvement actions.

CLTR should be viewed as an analytical tool which builds upon and can be used in conjunction with other PSRO information and activities in order to meet program objectives. The initial results of CLTR can indicate problem areas where further analysis, e.g., profile analysis, indepth medical records review, may be warranted to identify where review should be focused. This analysis can lead to establishing measurable objectives and targeting PSRO monitoring to determine progress in resolving problems specific to the individual hospital. Similarly, CLTR can be part of the process whereby PSROs assess and document their impact at the local level.

CLTR may be carried out as an MCE study and can count towards the minimum number requirements set by HSQE, or it can be performed as part of a PSRO's responsibility for assessing and monitoring delegated and nondelegated review. When carried out as an individual hospital MCE study, costs would be assigned to the delegated or nondelegated hospital MCE study function. When performed as an areawide MCE study or as part of the PSRO's assessment and monitoring of delegated and nondelegated review, costs would be assigned to areawide hospital review costs.

The attached document provides detailed guidance and instructions on how to perform CLTR. In addition, 1-day workshops will be organized by the American Association of Professional Standards Review Organizations (AAPPSRO), as part of its expert assistance contract with HSQE, to provide training to interested PSROs. Further communication on the dates and locations of these workshops will be forthcoming through AAPPSRO.



Michael J. Goran, M.D.

Attachment

TECHNICAL ASSISTANCE DOCUMENT

IMPLEMENTING A CARE LEVEL AND TIMELINESS

REVIEW PROGRAM

U. S. DEPARTMENT OF HEALTH, EDUCATION AND WELFARE

HEALTH CARE FINANCING ADMINISTRATION

HEALTH STANDARDS AND QUALITY BUREAU

Prepared by McKinsey & Company, Inc.

Pursuant to Contract # HSA-240-76-0071

March 1978



## TABLE OF CONTENTS

	<u>Page</u>
<u>I - CARE LEVEL AND TIMELINESS REVIEW AND ITS USES</u>	1
<u>II - ANALYZING CARE</u>	6
Designate Key Participants	6
Process Leader	7
Records Analyst	7
Physician Advisor	8
Administrative Liaison	8
Set Review Criteria	9
Level of Care	9
Timeliness of Care	9
Other Criteria	12
Categorize Possible Causes of Avoidable Days	12
Specify the Sample Structure	13
Select the Sample Cases	15
Conduct Records Review	16
Evaluating Necessity for Admission	16
Reviewing Timeliness of Care	18
Summarize Results and Extrapolate to Hospital	22
Discuss Findings with Hospital Leadership	23
<u>III - DEVELOPING CORRECTIVE ACTION PROGRAMS</u>	24
Identify Underlying Causes	24
Physician Management Delays	25
Ancillary Service Delays	26
Nursing Home Placement	26
Outpatient Substitution	27
More Frequently Available Services	28
Establish Improvement Objectives	28
Develop and Gain Agreement on Specific Corrective Actions	31

TABLE OF CONTENTS  
(Continued)

	<u>Page</u>
<u>Exhibits</u>	
1 - Care Level and Timeliness Review Illustrative Timetable and Staff Hours	33
2 - Target Turnaround Times	34
3 - Summary of Causes of Potentially Avoidable Hospital Days	35
4 - Admissions/Discharges List for Sample Selection	36
5 - Record Review Worksheet	37
6 - Medical Records Analysis Summary	38
7 - Record Review Worksheet, Example 1	39
8 - Record Review Worksheet, Example 2	40
9 - Results of Records Analysis, Hospital A	41
10 - Results of Records Analysis, Hospital B	42
11 - Results of Records Analysis, Hospital C	43
12 - Routine Inpatient X-Ray Process	44
13 - Hospital Corrective Action Plan	45

TABLE OF CONTENTS  
(Continued)

	<u>Page</u>
<u>APPENDIX - STATISTICAL CONSIDERATIONS IN SELECTING A SAMPLE OF CASES FOR REVIEW</u>	46
<u>Exhibits to the Appendix</u>	
A - 1 - Size of Confidence Interval vs. Sample Size for Various Avoidable Days Percentages	50
A - 2 - Size of Confidence Interval over Range of Avoidable Days Percentages for a 200-Case Sample	51
A - 3 - Random Number Table	52

STORY OF THE COUNTRY  
1860-1900

THE AMERICAN COUNTRY - HISTORY  
LITERATURE AND POLITICAL ECONOMY

Volume A. 1860-1870.

WITH SEVEN HUNDRED ILLUSTRATIONS, AND A  
BIBLIOGRAPHY OF COUNTRY LITERATURE.

IN EIGHT VOLUMES. PUBLISHED IN MONTHLY PARTS.  
VOLUME A. 1860-1870. PRICE, \$1.00.

1860-1870. 1871-1880. 1881-1890. 1891-1899.

## CHAPTER I

### CARE LEVEL AND TIMELINESS REVIEW AND ITS USES

The purpose of this document is to provide PSROs and hospitals the information needed to carry out a supplementary approach to utilization review - Care Level and Timeliness Review (CLTR), which has recently been tested in two PSROs and three hospitals under the auspices of the Health Standards and Quality Bureau (HSQB). CLTR is fundamentally a form of medical audit dealing with the appropriateness of admissions and continued stays and the timeliness of the care provided to those people who are hospitalized. Its promise lies in its potential for helping PSRO and hospital managements (1) determine the extent and underlying causes of unnecessary hospital utilization, (2) develop goals and corrective actions for reducing avoidable hospital days, and (3) evaluate progress in implementing these actions.

The concept of CLTR is based on periodic, retrospective review of a statistically representative sample of patient records. For each patient whose record is included in the sample, appropriateness of admission and readiness for discharge can be reviewed against the same criteria used for admission certification and continued stay review in current PSRO programs. For those patients whose admissions are appropriate, the timeliness of the care process applied to them during hospital stay is reviewed - but not against diagnosis-specific length of stay norms such as those used in the continued stay review program. Instead, target "turnaround times" for frequently occurring care events are defined by the PSRO and hospital staffs. Then, for each record the reviewer: (1) identifies any care delays in relation to these turnaround times, (2) evaluates the impact, if any, of such care delays on inpatient hospital days, and (3) determines the apparent causes of such delays.

The aggregated results of the review of the records sample are then extrapolated to the hospital as a whole to provide an estimate of: (1) the portion of inpatient days during the review period that potentially could have been avoided if the hospital's admission, discharge, and treatment processes had worked as well as expected; and (2) the areas in which action to improve care processes might be taken. These extrapolated results

likely will suggest problem areas in which more intensive studies should be undertaken. Once any further studies are completed, targeted action programs to avoid unnecessary patient days and improve patient care can be developed, costed out, and, when feasible, implemented.

CLTR is not designed to evaluate the appropriateness or quality of services provided to patients once the medical necessity of admission has been determined. However, review of the records sample may be used to measure the incidence of generic care problems not directly related to admission/discharge appropriateness or care timeliness - i.e., conditions that are not diagnosis-specific but cut across the case mix of the hospital. Drug reactions might be an example of such problems. Similarly the records review could test for adherence to certain hospital policies, such as timely entry of discharge summaries.

The remainder of this chapter describes a number of important roles CLTR can play in helping PRSOs and hospitals improve the utilization of inpatient hospital services. These roles include: (1) developing programs to improve care timeliness; (2) focusing review procedures to concentrate on problem areas; (3) screening hospitals for exemption from concurrent review procedures; (4) setting objectives for and measuring utilization improvements; and (5) supporting health care planning efforts.

1. Improving care timeliness. Although it incorporates review of admission and discharge practices, CLTR's unique contribution is the capability it provides for evaluating the timeliness of care rendered in a hospital - in terms of both the expedition with which individual hospital functions affecting patients' lengths of stay are carried out and the timeliness with which physicians take action on the information available to them in treating their patients. The process is specifically designed to both identify systematic delays in a hospital's care processes and to point to the causes for those delays. With such information in hand, hospital and PSRO managers can develop and carry out action programs aimed at correcting the problems leading to delays in the care process. Earlier experience with CLTR, as well as the recent test in three diverse community hospitals associated with two PSROs, has demonstrated its effectiveness for this purpose.

2. Focusing review procedures on important problems.

CLTR records sample review and follow-up studies can provide reliable information for focusing concurrent review procedures, profile analyses, and other care program improvement studies on high-potential problem areas:

¶ For example, CLTR might show that inappropriate admissions are not a significant problem for a hospital, but that failure to discharge when maximum hospital care benefit had been achieved is contributing importantly to avoidable days of hospitalization. Under these circumstances, the PSRO might concentrate on continued stay review, even instituting more frequent reviews, while scaling back or eliminating admissions certification.

¶ Alternatively, where CLTR suggests that insufficient substitution of outpatient for inpatient care and too little pre-admission work-up are problems, steps could be taken in the concurrent review process to strengthen admission review - e.g., tightening admission criteria or establishing preadmission review for certain cases categorized by diagnosis, intended surgical procedure, or physician.

¶ A conclusion from CLTR that "physician management" problems are contributing importantly to avoidable days of hospitalization could trigger a profile analysis aimed at validating this finding and pinpointing physicians or services for which the problem may be particularly acute. Indeed, it may be possible from the data developed in the CLTR to identify portions of the physician staff or hospital case mix where these problems appear most troublesome to provide a basis for focusing the profile analysis. In either case, the result might be a decision to concentrate continued stay review on those physicians or case types offering the greatest opportunity for reduced hospital utilization.

¶ A records sample review and follow-up studies might indicate that physician delay in ordering discharge is a systematic problem for a group of physicians or type of diagnosis. In such cases more intensive continued stay review along with peer counseling might be an appropriate corrective action.

3. Screening for exemption from concurrent review. Just as CLTR can be used to identify areas where PSRO effort should be concentrated, the results can also be used along with other PSRO information to help reach decisions to exempt hospitals from concurrent review. Hospitals that evidence few avoidable patient days, or for which well-conceived action programs are developed to correct the causes of the avoidable patient days identified, could be relieved of concurrent review requirements. In the latter case, PSRO and hospital management could concentrate until the next CLTR review on ensuring that action programs developed on the basis of the preceding records sample study were being pursued and the results documented. In either case, CLTR could be conducted on an annual basis under direction or with the monitoring of the PSRO in order to assure the continued appropriateness of the decision. If exemptions thresholds are appropriately set, overall program cost-effectiveness can be better served by exemption of a hospital under specified circumstances than by continued application of relatively costly concurrent review procedures.

4. Setting objectives for and measuring utilization improvement. The results of a CLTR study at a hospital can be agreed upon as a target for the coming year - expressed in terms of a reduction in avoidable days to be achieved. Then, as long as fairly comparable records sample review procedures (sampling technique, turnaround times, and the like) are employed, and the mission of the hospital does not change substantially in the interim, the improvement potential of a hospital identified in a subsequent review can fairly be compared with these objectives to determine whether progress is being made in eliminating avoidable days of hospitalization. Between CLTR studies, the PSRO can monitor progress in carrying out agreed upon improvement actions. Thus, the CLTR can provide a basis for establishing objectives for utilization improvement, and for measuring progress in accomplishing those objectives at the level of the individual hospital or across all hospitals within a PSRO area.

5. Supporting health care planning activities. CLTR provides aggregate information on the efficiency with which health care resources are utilized, and thus can be used to identify

potential savings in inpatient days and associated operating costs and beds. Such information can be valuable to health care planners and other health related agencies. Health Systems Agencies and state planning agencies could use information from periodic CLTR studies as one basis for reaching decisions on facilities expansions or retrenchments, and for guiding service capacity and equipment actions by hospitals and by long-term care facilities, free-standing clinics, and other providers to promote appropriate hospital utilization. Similarly, as rate-setting and capitation reimbursement programs develop across the country, data from CLTR studies could provide useful information to agencies involved in these activities. Use of such findings by other agencies - for example, for budget-setting - should help provide incentives for hospital leadership to devise and implement action programs to reduce the level of avoidable hospital days identified by CLTR.

\* \* \*

The remainder of this document presents the steps to be followed in implementing CLTR.

## CHAPTER II

### ANALYZING CARE

CLTR has two phases. This chapter deals with the first phase, analysis of a hospital's care activities through retrospective review of a representative sample of recent medical records. During this phase, the extent of the potentially avoidable hospitalization incurred at a hospital is determined in total and by major apparent cause. The next chapter describes the second phase - the development of realistically achievable action plans designed to correct the most significant underlying causes of unnecessary hospitalization.

The care analysis phase of CLTR has eight steps: (1) designate the key participants, (2) set review criteria, (3) categorize possible causes of avoidable days, (4) specify the sample structure, (5) select the sample cases, (6) conduct the records review, (7) summarize the results and extrapolate to the hospital, and (8) present findings to hospital leadership.

#### 1. DESIGNATE KEY PARTICIPANTS

There are four roles to be played in carrying out CLTR: (1) process leader, (2) records analyst, (3) physician advisor, and (4) administrative liaison. The same individual may play more than one role; no role requires full-time effort over an extended period of time. Together, the process leader, physician advisor, and administrative liaison form what could be termed the CLTR management group.

Exhibit 1 illustrates the timetable and staff time requirements for a typical application of CLTR. In the example, fewer than 500 hours of PSRO and hospital staff time are required over a 20-week period. Of course, the time requirements and scheduling may vary considerably from hospital to hospital, depending on such factors as (1) the clarity of the medical records; (2) the extent and complexity of identified causes of avoidable days; (3) the ease with which appropriateness of admission and discharge criteria are applied; and (4) the intrusion of other PSRO or hospital priorities on staff time. The following paragraphs briefly describe each of the key roles in the CLTR process.

Process Leader. The CLTR process leader, who should be a member of the PSRO staff, has three principal responsibilities.

1. Directing and monitoring the application of CLTR in each hospital
2. Carrying out some of the more complex and important analyses
3. Presenting interim and final findings to PSRO, hospital, and other audiences, and assisting in developing corrective action programs.

Thus, the process leader is ultimately responsible for the effectiveness of CLTR in significantly reducing medically unjustified hospitalization. He or she should be prepared to spend about 1 day per week over a 15- to 25-week span in applying CLTR in a single hospital.

Records Analyst. The records analyst's chief responsibility is the review of all sample charts, in conjunction with the physician advisor where necessary, to determine avoidable hospital days. A single chart should take 20 to 60 minutes to review, depending on its complexity, documentation, and extent of apparently unnecessary hospitalization. The records analyst also carries out other clerical or analytical tasks related to the records review, such as arranging for the records to be drawn, summarizing results, and carrying out follow-up analyses of the records or of other data.

The records analyst, who could be a member of either the PSRO or hospital staffs, should be familiar with medical records and terminology, and should be able to be judicious and thorough in reviewing a large sample of records. In the recent demonstration of CLTR in three hospitals, the records analysts were an experienced records review coordinator, a medical care evaluation (MCE) analyst with a background in pharmacology, and a third-year medical school student; all were paid by a PSRO. In another setting, medical residents were effective records analysts. The records review can be scheduled flexibly to accommodate the records analyst's other responsibilities.

Physician Advisor. The physician advisor is charged with maintaining the medical integrity of the CLTR records review process. His or her participation is critical in establishing review criteria, evaluating physician decision-making in complex or inadequately documented cases, developing feasible plans to correct apparent problems in physicians' case management and in the overall functioning of the hospital, and gaining understanding of and support for action plans among hospital staff.

The physician advisor should expect to review 10 to 20 percent of the 200 cases sampled, both to validate the records analyst's findings with respect to straightforward cases and to provide medical expertise in more complex ones. Each case reviewed should take 10 to 20 minutes, since the records analyst will have diagrammed the significant case events ahead of time. Altogether, the physician advisor should expect to devote 1 to 2 hours a week to the CLTR process in one hospital.

Administrative Liaison. The administrative liaison represents hospital management on the CLTR management group. He/she also should provide administrative support to the process (e.g., arranging for work space and medical records department assistance), advise on care timeliness criteria in administrative areas, help to analyze underlying causes of apparent delay, and develop with the process leader and physician advisor cost-effective, implementable corrective action plans. An assistant director played this role in two of the three hospitals in which CLTR was recently tested. The records analyst performed this function in the third, and smallest, hospital.

The administrative liaison should have the support of hospital leadership and should understand hospital operations. He/she should be able to locate necessary hospital financial and operational data, facilitate examination of functions suspected of causing care delays, and be able to work with hospital leadership to implement proposed corrective action plans.

The time required of the administrative liaison is minimal until CLTR's second phase - pinpointing causes of avoidable days and developing corrective action plans. One or two days a week over 1 to 3 months may be required during this phase.

## 2. SET REVIEW CRITERIA

At least two types of review criteria must be agreed on: (1) admission and discharge - "level of care" - appropriateness; and (2) timeliness. If CLTR is to be used to evaluate not only care level and timeliness but also the appropriateness of certain inpatient care practices, adherence to certain administrative policies, or frequency of specific care problem indicators, review criteria are needed in these areas as well. This section describes these criteria more fully and suggests how they should be developed.

Level of Care. Level of care criteria assist the records analyst in determining: (1) whether a patient should have been hospitalized in the first place; (2) if so, whether there were tests or procedures that should have been carried out before admission; and (3) when the patient should have been discharged. Many PSROs will choose to employ the identical criteria used in concurrent review in assessing appropriateness of admission and discharge - for example, the American Medical Association's Sample Criteria for Short-Stay Review as altered to reflect local practice patterns.

Timeliness of Care. Criteria for timeliness of care, or "target turnaround times," are the elapsed times between the initiation of the order for a diagnostic or therapeutic procedure or test and the performance of that procedure or the availability of test results. Turnaround times used in the recent application of CLTR in three hospitals are set out in Exhibit 2. There are two main steps in developing target turnaround times:

1. Agree upon the diagnostic and therapeutic actions for which timeliness of care criteria are to be established. The CLTR process leader and/or administrative liaison should meet individually or in a group with the heads of those departments responsible for key diagnostic and therapeutic services (radiology, clinical laboratories, social work, surgical scheduling, and administration) to agree on the diagnostic or therapeutic actions or procedures which, if not performed in timely fashion, could influence length of stay. As illustrated by the timeliness criteria developed for the three hospitals in

the recent CLTR demonstration (see Exhibit 2), the actions may include (a) physician's diagnostic or therapeutic intervention in the patient's course of care, (b) laboratory tests, diagnostic X-ray procedures, EKGs, and EEGs, (c) consult responses, (d) surgical procedures, (e) discharge planning activities, including nursing home placement and arrangement of suitable home environments, and (f) administrative discharge processing. Events included in the list should have two qualities: first, they should be capable of causing an impact on length of stay; secondly, they should be traceable from the medical charts.

2. Establish the target turnaround times. The process leader, administrative liaison, and physician advisor should work with other hospital staff members as appropriate to establish target turnaround times. These performance criteria should reflect:

a. Normal practice regarding "availability to the physician." That is, turnaround time for routine X-ray procedures should be measured from the time the doctor's order is written to the time results are available to that doctor. Nevertheless, the "time results are available" can mean different things, depending on when and how hospital medical staff commonly review results from radiology: (1) when the film is developed and available for reviewing in the X-ray department; (2) when films are verbally reviewed during X-ray rounds at day's end; (3) when the film has been evaluated by a radiologist or technician and a report dictated, transcribed, and delivered to the ward; or (4) when the transcribed report has been filed in the patient's chart. The CLTR management group and department heads must decide which of these times is most pertinent and whether the measure chosen can be determined from reviewing the sample charts.

b. The hospital's accepted standards for procedures. Turnaround times should reflect the elapsed times for procedures normally expected within the hospital for each service when it is functioning smoothly. They should not represent the longest or shortest expected times, nor need they represent statistically determined mean turnaround times. Rather, they should be based on reasonable expectations according to

the best judgment of the CLTR management group and department heads. For example, Exhibit 2 shows, for Hospital A during the recent CLTR demonstration, that routine laboratory tests ordered in the morning were expected back the same day. When the test was ordered in the afternoon, results were expected back the next weekday. Therefore, that hospital set its target turnaround time for this kind of procedure as "same or next weekday."

c. More ambitious but realistically achievable turnaround times than currently accepted standards for activities whose pace might be improved. Turnaround times set according to accepted standards when compared to actual times on the medical charts reflect the extent to which the hospital meets its own performance expectations. But there may also be certain departments or procedures which the CLTR management group or department heads believe realistically could be more responsive, e.g., where a hospital's accepted turnaround times for one department are much longer than those for other departments in the same institution or than those of similar departments in other institutions. Improvements in such departments' responsiveness might hasten a patient's care without compromising its quality and, in some instances, even enhancing it. If such a procedure is identified, a second, more desirable turnaround time should be devised and applied along with the accepted standard.

For instance, a hospital may wish to determine the extent to which limited special X-ray scheduling prolongs its patients' lengths of stay. To illustrate: if certain special X-rays were performed only Tuesday and Thursday, a target turnaround time set as "the next available Tuesday or Thursday after the exam is clinically indicated" would serve only to show how efficiently the hospital operates based on its current scheduling capabilities. A turnaround time for special X-rays set as "same or next weekday" would allow reviewers to measure the extent to which current scheduling capabilities lead to avoidable hospitalization days. Where desired turnaround times differ from turnaround times that are reasonable under current hospital practices, two target turnaround times -

"desired" and "normal under current practices" - should be used in evaluating possible avoidable days. An explanation of how both sets of criteria can be used is provided in a later section, "Reviewing Timeliness of Care."

Other Criteria. As mentioned in Chapter I, the sample of cases to be reviewed retrospectively for care level and timeliness can also be reviewed for other problems that cut across a hospital's case mix. For example, PSRO or hospital leadership may wish to monitor other generic indicators of care problems such as infection incidence, drug reactions, patient accidents - in short, any indexes of the effectiveness or appropriateness of the hospital's care activities that most effectively can be explored through a hospital-wide sample of patient records designed to provide statistically meaningful information upon which to base corrective action.

Similarly, PSRO and hospital management may wish to use the record review procedure to assess adherence to certain administrative procedures. These might include whether: (1) admission notes are written within 24 hours of admission; (2) physical examination is performed and noted on the chart within 48 hours of admission; (3) patient history is taken within 48 hours; (4) progress notes are added to the chart at least every 3 days; and (5) the discharge summary is written within 15 days of discharge.

In either case, the necessary step is for the CLTR management group and the hospital staff to agree upon the criteria to be applied to the record sample.

### 3. CATEGORIZE POSSIBLE CAUSES OF AVOIDABLE DAYS

Another step necessary in preparing for case review is establishing categories for causes of avoidable days. These categories should be as specific as possible so that follow-up analyses after the records review, typically needed to provide a firm basis for developing corrective action programs, can be as limited and focused as possible. However, the categories should not be so specific that evidence in the medical records will be inadequate to show how a delay should be classified. All avoidable days

should fall into only one category. The categories and sub-categories employed in the recent demonstration are provided in Exhibit 3.

In some applications of CLTR, cause-of-delay categories might be defined to accommodate examination of the potential impact on avoidable inpatient days of alternative hospital operating policies or procedures. For example, in one hospital with access to a urologist on only Tuesdays and Thursdays, it might be appropriate to establish a specific delay category to reflect this limited capability. In this way extra days of stay which arose because the urologist was not available could be differentiated from those arising because he failed to respond when he was available. Presumably, the presence of many avoidable days due to the first cause would justify scheduling additional urology coverage, while many days in the second cause would suggest the need to work with the urologist to determine whether perhaps (1) the consult request system is faulty, (2) he has too little time to respond to the consult requests he receives, or (3) he needs to be more diligent in responding to consult requests.

If the records review is being used to evaluate the incidence of other problems in addition to avoidable days of hospitalization, such as generic care problems or adherence to certain hospital policies, categories for recording these findings will also be needed.

#### 4. SPECIFY THE SAMPLE STRUCTURE

The sample of medical records should provide a representative cross-section of cases to enable reviewers to draw meaningful conclusions about overall hospital utilization and operations. For this reason, the sample structure should follow strict guidelines: (a) certain kinds of admissions and discharges should be omitted from the records sample because the care practices and effectiveness of the hospital may not consistently affect the hospital days incurred by patients in those categories; (b) certain time periods should be covered; and (c) a certain number of cases should be included in the sample to be reviewed. The following paragraphs describe steps required to achieve this structure:

a. Identify categories of cases with the following characteristics so that they may be excluded from the sample:

☒ Stays not controlled by physicians or hospital management, e.g., stays ending in death or discharges against medical advice

☒ Programmed lengths of stay where hospitalization is rarely extended or foreshortened from program guidelines - e.g., admissions to 1-day dialysis or 2-week detoxification units

☒ Stays for which neither level of care nor length of stay is an issue - e.g., normal deliveries, possibly psychiatric admissions

b. Ensure that the time period covered by the sample represents current practices as accurately as possible. To avoid any seasonal effects, cases ideally should be chosen from a full 12-month period. However, the sample period should avoid, where possible, periods of major interruptions or alterations in normal hospital services (e.g., an operating room closed for repairs for 2 months) which might distort case mix or unfairly reflect delays in certain services. Finally, the time period should be recent enough so that it accurately reflects current care processes and does not identify problems for which solutions have already been found.

c. Specify a sample size which balances statistical power and resource economy. The statistical power of the method for estimating the percentages of days that are avoidable - either collectively or in relation to a specific cause - is largely unaffected by the size of the hospital. Rather, statistical power is primarily a function of the sample size and the size of the avoidable-day percentage being estimated. As described in the appendix to this document, for most hospitals a sample of 200 records will achieve a reasonable balance in this regard.

## 5. SELECT THE SAMPLE CASES

In selecting the sample of medical records to be reviewed, reasonably straightforward but specific procedures should be followed to ensure that the conclusions reached in reviewing the records can be usefully applied to the operations of the hospital as a whole. These procedures are described in detail in the appendix to this document. In summary, the following steps should be taken:

1. Obtain a comprehensive list of discharges during the sample period. Discharges, rather than admissions, should be used to ensure that the sample records represent completed stays. The list should provide the medical records number for each patient, or some other information - such as the patient's name - from which the medical record describing the case can be identified.
2. Using a set of random numbers, select 300 records. The appendix describes approaches for using random numbers to select the records sample. Initially selecting 300 records from the total list of patient records from the sample period should assure an ultimate sample of at least 200 records after diagnoses and dispositions deemed to be inappropriate for CLTR have been excluded. (If a hospital's patient mix reflects an unusually high proportion of cases categorized for exclusion from the sample, more than 300 records might be selected initially.)
3. Screen agreed-upon diagnoses and dispositions for exclusion from the 300-record sample. If the comprehensive list of discharges during the sample period provides sufficient information, records dealing with conditions that have been agreed to be excluded from the CLTR can be screened out before the records are pulled. Alternatively, the records themselves can be inspected as they are pulled to identify those to be excluded. Even if the comprehensive list provides information for screening for exclusions, during the course of the review the records analyst should perform a final check for any records that should be excluded.

4. Finalize the records sample. After screening for exclusions, more than 200 records may remain from the initial sample of 300. All may be reviewed, or the first 200 cases selected may be taken as the sample.

Final disposition of the initial 300 records sample should be documented using the form illustrated in Exhibit 4. In the illustration, all cases except those checked under "Normal" are excluded from the final 200-case sample.

#### 6. CONDUCT RECORDS REVIEW

The review of medical records is divided into two major parts: (1) evaluating the necessity for admission and (2) reviewing the timeliness of care and discharge where admission has been judged necessary. If other indexes of care program effectiveness or adherence to administrative policies are to be evaluated, they should be noted as the records are reviewed against care timeliness criteria.

In carrying out the records review, the records analyst should diagram and review every case, referring cases to the physician advisor: (1) if the records analyst cannot determine admission necessity or appropriateness of discharge timing, or (2) if the case is so complex that the records analyst cannot determine the "critical path" of care or the impact of care delays on length of stay. Physician advisor approval need not be sought in clear-cut instances of avoidable hospital days since - unlike the concurrent review process - CLTR does not result in payment denials.

Evaluating Necessity for Admission. The records analyst should evaluate each sample chart to establish whether the admission was necessary. Three steps are needed to evaluate an admission:

1. Fill out the top part of the Record Review Worksheet (see Exhibit 5). This part of the form includes an admission/discharge identification number to facilitate reference if questions arise about review conclusions. It also provides for recording other information such as admitting and final

diagnoses, chief complaints, age, discharge destination, length of stay, surgical procedures, and similar data which may be helpful in follow-up studies to determine the specific underlying causes of unnecessary hospitalization.

2. Assess appropriateness of admission based on admission criteria. In this step, the records analyst should determine whether the patient's indications supported admission. For instance, if the admitting diagnosis is "pernicious anemia," the agreed indications for admission might read: "(a) symptomatic anemia (e.g., chest pain, respiratory distress, weakness and fatigue, alterations of consciousness) or (b) neurologic deficit."\* If one of these criteria is satisfied by indications recorded in the chart, the analyst should judge the admission necessary and proceed with review of the timeliness of care. If one of the criteria is not found, the chart should be referred to the physician advisor for judgment on the necessity of admission.

3. Record results on the Medical Records Analysis Summary. If, after review by the physician advisor, an admission is judged inappropriate, the records analyst should write "Admission Not Necessary" on the Record Review Worksheet and record the patient's total stay as avoidable days under the Medical Records Analysis Summary column marked "Patient Could Have Been Diagnosed or Treated on an Out-patient Basis" (see Exhibit 6).\*\*

---

\* - American Medical Association, Sample Criteria for Short-Stay Hospital Review, p. 55.

\*\* - Very occasionally, a patient may be admitted inappropriately but incur a condition while in the hospital that justifies admission. Each "inappropriate admission" record should be checked for such circumstance, and only those hospital days before the condition became evident should be counted as avoidable due to inappropriate admission; the remainder of the stay should be reviewed for timeliness of care and discharge.

Reviewing Timeliness of Care. Timeliness review involves measuring the potential for reducing the length of stay for an appropriately admitted patient by improving the pace of the hospital's care processes. For cases whose admission is judged appropriate, timeliness review comprises five steps: (1) laying out the course of hospitalization for each patient, (2) identifying delays, (3) evaluating any impact of these delays on length of stay, (4) identifying causes of the delays, and (5) entering findings on the Medical Records Analysis Summary.

1. Laying out the course of hospitalization on the Record

Review Worksheet. The hospital record of each patient should be reviewed in detail to determine exactly what happened, and when, during the course of care. All diagnostic and therapeutic procedures and tests should be recorded in time sequence from admission to provide the basis for subsequent evaluation of the timeliness of the care program. Special note should be made of the points at which a given diagnosis was ruled out, specific therapy was begun and ended for a given diagnosis, or complications, if any became evident or disappeared. These events represent medical milestones in a patient's hospital stay and have implications for the physician's management of the patient and for the patient's length of stay. For cases with multiple diagnoses or "rule-outs," it is helpful first to note the points at which a diagnosis was ruled out and then to record those diagnostic and therapeutic procedures and tests related to the decision.

2. Identifying delays in the course of hospitalization. The

records analyst accomplishes this step by comparing the turnaround time taken for each procedure and test recorded on the Record Review Worksheet with the target turnaround time set in the initial stages of CLTR. In addition, the records analyst should determine whether the criteria for timely discharge for this diagnosis or procedure were met any sooner than the day on which discharge was ordered. If there are no apparent delays in hospital care or in discharge, the records analyst should note "No Delays" in the "Apparent Delays" column on the Record Review Worksheet. The sample number, admission/discharge number, primary diagnosis, and actual length of stay should be recorded on the Medical

Records Analysis Summary and "0" placed under "Total Number of Avoidable Days." Analysis of the chart is then complete if there are no delays.

If there are delays, the records analyst should record the number of days for each delay in the "Apparent Delays" column. Where both an accepted standard and a more ambitious turnaround time have been assigned, both the number of days' delay according to the first turnaround time and the additional delay resulting from applying the more ambitious turnaround time should be noted. No entry should be made on the Medical Records Analysis Summary yet, because the delays have not yet been evaluated for their actual impact on length of stay.

3. Evaluating delays for their impact on length of stay. There are delays in many patients' courses of treatment. However, many of these delays do not result in avoidable days of hospitalization because the patient had to be in the hospital for other procedures that were underway. The relevant delays for CLTR are those which prolong length of stay; they should be distinguished from those that do not prolong stay in order to determine the hospital's potential for reducing avoidable days of hospitalization across its patient load. The essential question to answer in determining length of stay impact is whether the patient could have been discharged earlier if the delay had not occurred. In determining the answer, the following questions should be considered:

§ Were the results of delayed diagnostic procedures critical to the next step in diagnosis, or to initiation or continuation of the patient's active treatment?

§ If there were delays in completing specific procedures, did the necessity for ongoing therapy or treatment to alleviate the patient's illness during this period override any impact the delays might otherwise have had on length of stay?

§ Was the patient's health status such that complications slowed his otherwise timely diagnosis or treatment?

Special note should be made here of two points. First, at no point in timeliness review should the records analyst presume more information than was available to the attending physician at the time he acted. Second, where length of stay seems prolonged and the patient appears stabilized, the records analyst usually should give the attending physician's judgment for continued stay the benefit of the doubt, unless discharge guidelines or the physician advisor suggest otherwise.

The following case examples, based on the recent test, illustrate how delays in the courses of patients' care can be evaluated for their contribution to avoidable days of hospitalization:

Example 1. The case diagrammed in Exhibit 7 is that of a 71-year-old diabetic who has suffered a stroke, resulting in left-side paralysis. The course of therapy was fairly routine for this sort of case, but a number of delays occurred, some of which lengthened this patient's hospital stay unnecessarily. A physical therapy consult was ordered on the day of admission, but was not answered and therapy begun until the third day of care - a 1-day apparent delay. On the day of admission, the attending physician realized that this patient would need nursing home care and so ordered the Social Service Department to initiate placement planning. However, Social Service did not initiate the placement process (by filling out Form 256R) until Day 3 - a 1-day delay. Having mailed Form 256R to the Health Department the next weekday for approval, a process which typically takes a full day, Social Service reported on Day 8 that the patient was awaiting an open bed. On Day 14, Social Service was notified that a bed would be available one week later, and on Day 21 the patient finally was transferred to a nursing home. The physician advisor, upon reviewing this case, determined that the patient had received maximum hospital benefit by Day 4.

To determine what impact these days had on length of stay, let us consider how the course of care should have proceeded had delays not occurred. Physical therapy would have begun one day sooner, continued through the stay, and still have been needed after discharge. Social Service would have initiated

placement on Day 2, mailed the 256R to the Health Department on Day 3, and, having given the Health Department Day 6 (Monday) to process the 256R, been able on Day 7 to place the patient in a nursing home if a bed had been available - 14 days sooner than it actually occurred. The physical therapy delay did not lengthen hospitalization unnecessarily as it was continued at the nursing home anyway. Social Service's delay in initiating placement planning may have contributed 1 day of delay, assuming that the number of days required for a bed to become available (once it is sought) is constant. The lack of a nursing home bed accounted for the remaining 13 unnecessary days, since the patient could have been discharged on Day 8 even if all other delays still had occurred.

Example 2. In the case diagrammed in Exhibit 8, a 70-year-old was admitted with elevated blood sugar and hallucinations. Diabetes and cerebral arteriosclerosis were the focus of care. Over 16 days, blood sugar levels were eventually stabilized, until tolinsase could be lowered to a maintainence dose on Day 20. The records analyst - with confirmation by the physician advisor - felt that discharge was indicated on Day 21, 2 days earlier than discharge occurred. This delay added unnecessarily to length of stay. However, other delays - the 2-day delay in Dr. C's response to a consultation request and the 3-day delay in ordering physical therapy - had no apparent impact on length of stay since they occurred while the patient's blood sugar levels were still uncontrolled and did not delay any care leading to discharge.

4. Identifying and recording the apparent causes of avoidable patient days. Identification of the specific causes for avoidable days of hospitalization is the starting point for developing programs to reduce inappropriate hospital utilization. Critical delays in the course of care should be categorized by broad cause - primarily either medical or administrative - and subcategorized as shown in Exhibit 3. Thus, in the case set out in Exhibit 7, 1 day of unnecessary hospitalization was attributed to "Nursing Home Placement Delay - Social Service" and 13 days to "Nursing Home Placement Delay - Lack of Bed or Funding" - 14 days in all. In the second example diagrammed

in Exhibit 8, the 2 days of unnecessary hospitalization were attributable to the physician's delay in ordering discharge.

For each case, the avoidable days - by cause and in total - should be entered in the appropriate column of the Medical Records Analysis Summary (Exhibit 6).

#### 7. SUMMARIZE RESULTS AND EXTRAPOLATE TO HOSPITAL

After all records are reviewed, the CLTR process leader should summarize the sample results to estimate the proportion of in-patient days that are avoidable in total and by cause. Accomplishing this task involves summing the avoidable days for each column on the Medical Records Analysis Summary and then calculating two percentages: (a) avoidable inpatient days divided by total sample inpatient days and (b) avoidable inpatient days for each cause divided by total avoidable days, according to the formula provided on Exhibit 6.

With these proportions in hand, the process leader can estimate the quantity of avoidable inpatient days incurred by the hospital during the sample period in total and by each major cause by taking the following steps:

- a. Determining from hospital records the total hospital inpatient days during the time period covered by the sample.
- b. Determining the number of inpatient days associated with the kinds of admissions, discharges, or procedures omitted from the sample, e.g., total hospital days associated with normal deliveries. This number often can be obtained from hospital data for the period sampled. If actual data are not available, the number can be estimated by multiplying the hospital's total patient days times the ratio of 1) the number of patient days associated with cases excluded from the sample in choosing the 200 cases to be analyzed, to 2) the sum of total patient days in the 200-case sample and the patient days associated with cases excluded from the sample in choosing the 200 cases.

c. Subtracting "b" from "a."

d. Multiplying the remaining days in "c" by the percentage of total avoidable days overall and for each case derived from sample results. Exhibits 9, 10, and 11 illustrate the range of avoidable days of hospitalization in total and by cause for three hospitals where CLTR was tested. These results provide an estimate of potentially avoidable days for further analysis as described in Chapter III.

#### 8. DISCUSS FINDINGS WITH HOSPITAL LEADERSHIP

The CLTR management group (process leader, physician advisor, and administrative liaison) should meet at least twice during the course of the records review with other appropriate members of the hospital's medical and administrative staffs to discuss the results of the review. After 100 cases have been analyzed the process leader should summarize emerging results for preliminary evaluation and discussion of questions and issues. At a second meeting, final results of the records review should be presented and agreement reached, if possible, on the extent of potentially avoidable hospitalization, the kinds of problems identified, the relative priority of those problems, and the major areas requiring further study. This agreement sets the stage for the second phase of CLTR - the development of realistic plans to diminish unnecessary hospitalization and correct any other problems identified in the records review.

## CHAPTER III

### DEVELOPING CORRECTIVE ACTION PROGRAMS

Where the records review described in the previous chapter points to relatively little unnecessary hospitalization, this evidence, along with other pertinent data (e.g., low length of stay compared with a PAS or other case mix-adjusted standard) could be used by the PSRO to exempt a hospital from admissions certification and/or continued stay review. In hospitals where there appear to be significant numbers of potentially avoidable days, the CLTR process leader, physician advisor, and hospital administrative liaison should take the lead in developing and gaining hospital staff commitment to implement feasible programs to avoid unnecessary hospital days. Such programs most often will consist of a mix of focused review and special actions designed to improve the functioning of the hospital's care activities in areas shown by the records review and subsequent analyses to be contributing importantly to avoidable inpatient days or other care program problems.

Developing action programs based on the records review requires: (1) designing and carrying out follow-up analyses to identify in each apparent problem area the underlying causes of avoidable days or other problems; (2) establishing improvement objectives; and (3) developing and gaining agreement on cost-effective, implementable corrective actions.

#### IDENTIFY UNDERLYING CAUSES

Appropriate and feasible actions to ameliorate major apparent causes of unnecessary hospitalization may be clear from the results of the records review alone. More likely, follow-up studies will be required to identify specific underlying causes contributing to each problem area so that targeted action plans to deal with them can be designed and evaluated for feasibility.

For example, it would be important to know whether physician management problems (discharge delays, delayed orders on the critical path, inappropriate admissions, etc.) are concentrated among certain services or individual practitioners so that review

procedures and other corrective actions could be focused on these areas. Similarly, if nursing home placement is an apparent problem, further study may be needed to determine whether the hospital's discharge planning process is less than fully effective or if there are simply too few nursing home beds in the area appropriate to the physical and financial needs of the hospital's patients awaiting placement. Clearly, resolution of such an issue must precede development of a program to solve the "nursing home placement" problem.

The following paragraphs describe possible follow-up studies to identify underlying causes of avoidable days attributed in the Medical Records Analysis Summary to: (1) physician management delays, (2) nursing home placement delays, (3) ancillary service delays, (4) failure to provide care on an outpatient rather than inpatient basis, and (5) services too infrequently available. These approaches were employed or considered in one or more of the three hospitals participating in the recent CLTR test. They are, of course, intended to be illustrative of possible follow-up analyses in each area; actual studies should be tailored, as these were, to the specific circumstances of each review.

Physician Management Delays. In order to determine possible causes of care delay attributed to physician management in the records review, in one of the demonstration hospitals the process leader and records analyst met with several physicians to review the diagrams of the cases in the sample which evidenced apparent physician management delays. These discussions resulted in grouping the apparently avoidable days into three categories: (1) days which the physicians agreed were unnecessary; (2) days which the physicians felt were necessary but whose necessity was not documented in the record (e.g., family pressure); and (3) days which the physician felt were necessary on the basis of a more conservative care philosophy than that on which the initial conclusions were based in the records review.

Where the physicians agreed that inpatient days were unnecessary or where there was inadequate documentation of the reasons for continued stay, the interview process itself was felt to have made a contribution to correcting the problem. But further action to focus review on certain physicians and types of cases identified in the interview process was also undertaken. Thus, at this test hospital not only did the interviewing help pinpoint underlying

causes of delay and suggest where action might usefully be taken, it also played a part in correcting inappropriate behavior and, by familiarizing physicians with the CLTR process, improved their acceptance of other corrective action proposals.

A second approach taken by a process leader at a test hospital faced with apparent physician management delays was to conduct a profile analysis of the medical staff's active physicians to determine whether certain individuals or services experienced long average stays, after allowing for case difficulty. For the cases managed by these physicians over the preceding 6 months, data (length of stay, primary diagnosis, existence of a significant secondary diagnosis, whether there was surgery performed, and age) were obtained from PAS and other sources to permit comparison of actual length of stay and case mix-specific PAS regional median lengths of stay for each physician. The process leader then computed the ratio of actual days to the empirical norms represented by the PAS experience, and ranked the physicians by this measure. This physician profile analysis was designed to provide a basis for a focused review and consultation program to ameliorate the physician case management problem.

Ancillary Service Delays. In another setting in which CLTR was tested, a process leader examined more closely an apparent delay in the provision of routine X-ray services. Discussions with the hospital liaison and X-ray department director identified the points at which delays might occur (see Exhibit 12). Over a week's time (to prevent distortion of results by day of the week), times between major steps in the X-ray process were recorded by time-stamping each X-ray request slip as it passed a certain point in the process. The test was monitored after 2 days to ensure that it was running as planned. All of the week's X-ray requests were then analyzed and average process times calculated. In addition, slips which showed delayed turnaround in relation to the CLTR criteria were examined to determine what step contributed significantly to the delay. Once these findings were discussed with the X-ray department chief and hospital management, specific proposals to change several procedures were developed.

Nursing Home Placement. Nursing home placement delays can be a significant cause of apparently unnecessary hospitalization. If outplacement delays appear to be a problem, a first step is to determine whether unnecessary delays in physicians' initiation

and the social service department's processing of nursing home placement requests are a contributing factor. To determine whether outplacement delays were principally due to internal problems, one hospital in the recent demonstration project carried out an analysis similar to that described above for identifying bottlenecks in the X-ray process.

After ruling out internal delay as the cause of the nursing home placement problem identified in the records sample review, the test hospital focused on the reluctance of local nursing homes to accept promptly all patients ready for nursing home care. To this end, the Social Service Department recorded data (insurance coverage, level of care needed, etc.) every day for 4 weeks on each patient awaiting placement in a nursing home. From this record, the annual number of extra patient days resulting from lack of access to a nursing home bed was estimated by category of insurance coverage (or lack of it), by level of care required, and in total. Data from this analysis can be used by the PSRO and hospital to support an increase in nursing home per diems paid by Medicaid in their state.

In another setting, discrimination by insurance coverage might not be the problem so much as a general scarcity of beds in relation to the size of the over-65 population in the area. One PSRO documented the overall shortage of long-term beds by analyzing resource and demographic data provided by the local Health Systems Agency. To correct the situation, the PSRO and hospital could support applications for Certificates of Need for new beds filed by local nursing homes.

Outpatient Substitution. Where a CLTR indicates that a significant number of avoidable hospital days is due to inappropriate admissions, the process leader might tally the admitting diagnoses, admitting physicians, and avoidable days associated with each of those cases. On the basis of this preliminary evidence, he might recommend retrospective review of appropriateness of admission for the types of cases or physicians prominent in the tally and, where indicated by these studies, pre-admission certification for certain types of cases or for the cases of certain physicians.

If inappropriate pre-admission workup appears from a CLTR to be a significant cause of unnecessary hospitalization, a physician

profile analysis similar to the one described under Physician Management, above, could be conducted. However, instead of examining each physician's total stay experience against a case-matched empirical norm, pre-operative length of stay matched by category of surgical procedure would be tallied. In addition, if consultation with the physician advisor and others indicates certain pre- or post-hospitalization laboratory, X-ray, and other services are unavailable on an outpatient basis in the community, the process leader might ask the physician advisor to identify cases in the 200-record sample which could have been shorter if outpatient care had been available, list the specific outpatient services apparently needed, and estimate latent demand for them. With these rough estimates in hand, the process leader might develop with hospital management a plan to add outpatient services that would be cost-beneficial in terms of unnecessary hospitalization avoided.

More Frequently Available Services. Analysis of the 200-case sample might suggest that a significant number of hospital days could be avoided if certain services were offered more frequently (e.g., nonemergency surgery 6 days per week instead of 5). A follow-up study of the cases in which delay appeared for such reasons could be conducted to determine specifically which services were responsible for most of the avoidable days, and on what days they were needed. The process leader could then work with the hospital administrative liaison and directors of departments singled out in the previous analysis to evaluate the additional costs (net of hotel cost savings from eliminating some unnecessary hospitalization) and daily service volume changes likely to result if the services were offered on more days. The results of these analyses could be used to support the process leader's recommendations to the department directors and hospital leadership to expand the coverage of certain ancillary services.

#### ESTABLISH IMPROVEMENT OBJECTIVES

Not all days found to be potentially avoidable from a records sample analysis and follow-up studies can be eliminated through direct action by a hospital; some of the causes of avoidable days incurred at a hospital will be outside its control. Moreover, some problems

may require corrective actions that would cost more (either to the hospital or to the patients, where the costs could be passed through) than could be saved. In order, then, to set sensible and achievable targets for eliminating unnecessary hospitalization, the CLTR management group should determine: (1) whether the PSRO and hospital (including its medical staff) can act to eliminate the potentially avoidable days associated with each cause of delay; and (2) whether it would cost more to eliminate the unnecessary days than the potentially avoidable days now cost. Three steps are necessary:

1. Categorize avoidable days by susceptibility to action by the hospital. Based on further evaluation of the underlying causes of avoidable days identified in the records sample reviewed, the CLTR management group, working with members of the hospital staff as appropriate, should group the avoidable days incurred by the hospital into three categories: (a) avoidable days whose causes can be dealt with directly by the hospital and its medical staff over the coming year; (b) those days that the hospital and medical staff might make a contribution to reducing over a longer period of time, but which they likely cannot affect in the relatively near term; (c) avoidable hospital days whose causes are substantially outside the ability of the hospital or its medical staff to affect.

Most avoidable days due to lack of timeliness in the hospital's care programs should fall into the first category. Delays in physicians' management of the courses of care for their patients might fall into either categories a or b, with differences in care philosophy for a given condition being an example of a problem that might lead to assigning avoidable days to category b. Absence of adequate nursing home beds in the community might, under different conditions, cause assignment of avoidable days to either category b or c. (Of course, if the opportunity to establish a nursing home program using excess acute care beds at the hospital were available, avoidable days due to this cause might be assigned to category a.) These suggestions are meant to be illustrative; a careful evaluation by the CLTR management group will be needed to categorize avoidable days in terms of their susceptibility to action by the hospital and its staff.

2. Frame basic approaches and rough out economics. The process of identifying the underlying causes of avoidable days and assessing the extent to which the hospital and its medical staff could work to reduce them typically will have suggested the basic approaches to be taken in each area. In this step, these basic approaches should be set down more formally, and their implementation costs and savings potential compared.

In making these cost-benefit comparisons, both a system-wide and a hospital perspective should be applied. Under the cost reimbursement care financing systems prevalent throughout the United States, the economic implications of avoidable days of hospitalization and of actions to reduce those avoidable days may be different for the hospital and for the care system as a whole. Careful and cooperative review of these economics will be necessary on the part of the hospital and the PSRO. Moreover, it may be appropriate to involve third-party payers in this review.

The costs that can be eliminated by reductions in avoidable days most often will be "hotel costs" of inpatient days when treatment was not being rendered or where treatment could have been provided on an outpatient basis. The CLTR process assumes that treatment accorded patients will continue as experienced during the review period. Test experience suggests that the gross hotel cost saving potential per patient day avoided typically will fall into the range of \$30-50, but the hospital's financial officer should establish a more appropriate figure for that particular hospital by dividing its total annual patient days into the sum of "hotel function" costs allocated to the nursing floors. Only where substantial bed closings are programmed are reductions in nursing or other treatment staff costs likely to be realized.

3. Set and gain agreement on a target for avoidable days reduction. Based on the analyses described in the preceding steps, the CLTR management group should pose a challenging but realistic target for reduction in avoidable days of hospitalization overall and by major cause for the hospital for the coming year. This target should be reviewed extensively

with hospital administrative and medical staff, and their agreement to it gained.

With agreement on the target for avoidable days reduction in hand, and basic approaches to dealing with the underlying problems specified and economically evaluated, the CLTR management group will be in a position to move ahead to develop and gain agreement on a specific corrective action plan.

#### DEVELOP AND GAIN AGREEMENT ON SPECIFIC CORRECTIVE ACTIONS

For each significant underlying cause of avoidable days agreed by hospital leadership to be amenable to PSRO and hospital action and likely to cost less to correct than it now costs, the CLTR management group should "flesh out" the basic approaches developed in the previous section into a detailed, step-by-step action plan. Actions may deal with problems assigned to either categories a or b as determined in Step 1 in the preceding section, although avoidable day reduction targets typically should be set only for problems in category a. For each proposed action, the plan should (a) carefully define the steps to be taken; (b) specify a timetable; (c) assign organizational and personal responsibilities for carrying out each step; (d) estimate implementation costs, both one-time and on-going; and (e) project a measurable impact in the coming year in terms of reduced avoidable days and conserved resources (e.g., positions eliminated and dollars saved) by which to monitor progress. Exhibit 13 illustrates such a plan.

Once detailed plans are developed, they should be presented to hospital leadership for approval. However, even as the plan is being completed, there should be full discussion of the emerging actions and their implications to help ensure that a realistic plan is prepared and that agreement to it will be forthcoming. The plan - objectives and actions - should represent an explicit agreement between the PSRO and hospital for the coming year, with each organization committed to supporting the other in its accomplishment.

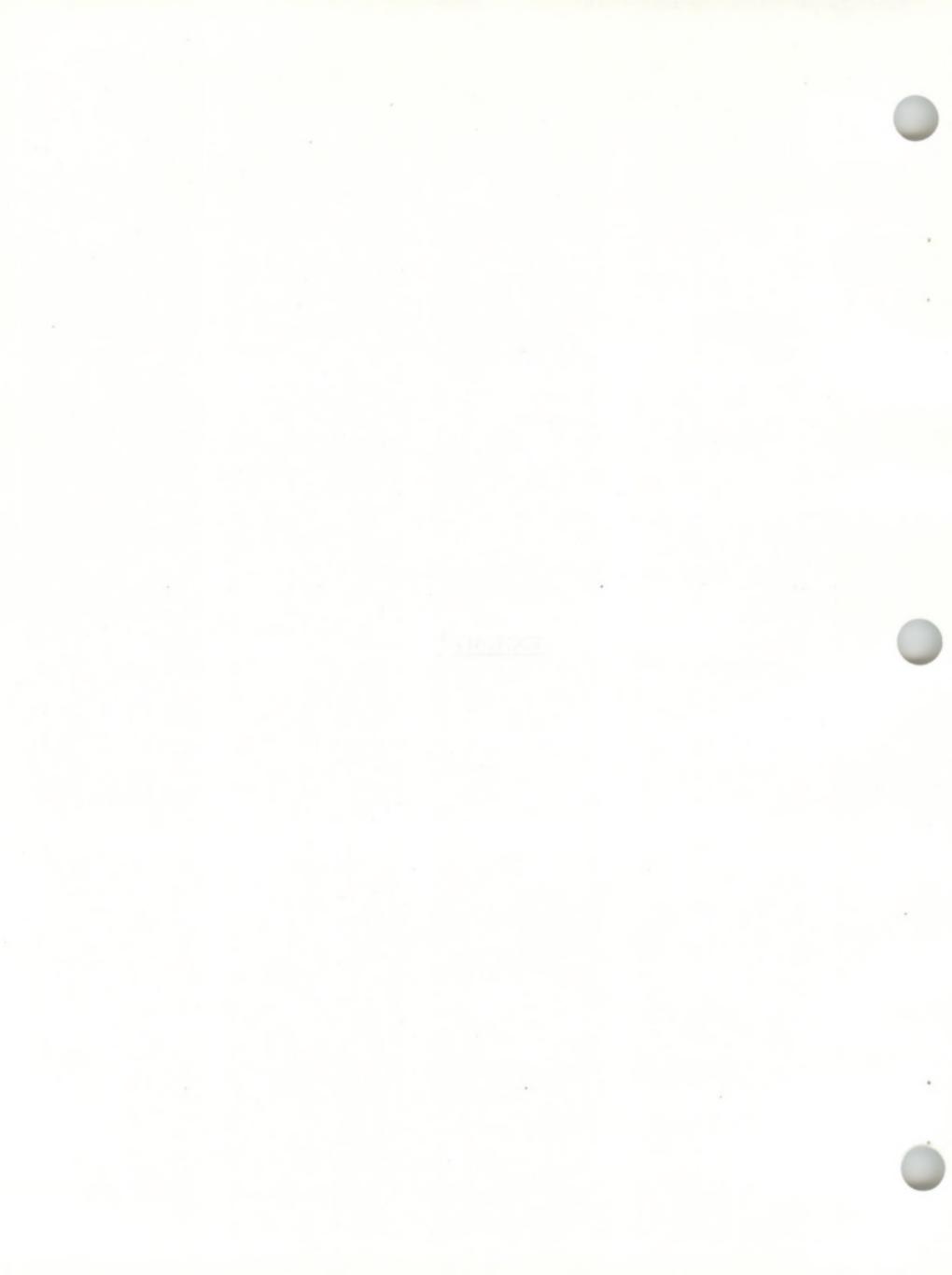
During the implementation period, determining whether the agreed upon actions are carried out should not be too difficult; but

monitoring results actually achieved will require re-application of CLTR to determine whether avoidable days in the areas targeted for action have been largely eliminated. If exemption from some or all other review responsibilities is agreed upon, substantial, demonstrable accomplishment of the plan should be understood as a requirement for continued exemption.

\*\*\*

CLTR provides an additional, potentially very useful tool for PSROs and hospitals to work together to reduce avoidable days of hospitalization. Realizing its potential will require imaginative and collaborative application of the procedures described in this document by administrative and medical leadership in PSROs and hospitals across the country.

EXHIBITS



## CARE LEVEL AND TIMELINESS REVIEW ILLUSTRATIVE TIMETABLE AND STAFF HOURS

### Based on Test Experience

Required Staff Hours			
Process Leader	Records Analyst	Physician Advisor	Administrative Liaison

**PHASE/TASK**

#### A. Analyzing care

1. Designate key participants	16	4	4	4
2. Set review criteria	2	0	2	2
3. Categorize possible causes of avoidable stay	1	0	1	1
4. Specify the sample structure	1	0	1	1
5. Select the sample cases	2	8	0	0
6. Conduct records review	25	150	8	0
7. Summarize results and extrapolate to hospital	4	0	0	2
8. Present findings to hospital leadership	2	2	2	2

### Phase I Sub-total

#### B. Developing corrective action plans

1. Identify underlying causes	30	60	5	30
2. Establish improvement objectives	20	0	5	30
3. Develop and agree on corrective actions	20	0	5	30

Pb-231 fission

### CLTR Total

**TARGET TURNAROUND TIMES**  
**(Unless noted, weekdays are Monday-Saturday)**

ACTIVITY	HOSPITAL A	HOSPITAL B	HOSPITAL C
1. Physician will order test, procedure, consult, or referral	First weekday clinically indicated by test result, consult report, procedure completion, or observed condition of patient	Same as Hospital A	Same as Hospital A
2. Laboratory test results will be available for physician review	Routine: same day if ordered in a.m. or next weekday if ordered in p.m. Special (cultures, Australian antigen): 1 week or as indicated	Routine: same day if ordered in a.m. or next weekday if ordered in p.m. Cultures, cardiac enzymes: 3 days or as indicated Viral and hormone studies: 1 week T3/T4, HAA: 5 days	Routine: next weekday Stat or Today Please: end of day Pre-operative: evening rounds same day Cultures: preliminary report by second morning, significant findings as they occur Special tests: several days as per lab schedule
3. Diagnostic x-ray will be available for physician review	Routine: same day or next weekday Special: second day or next weekday	Routine: same day or next weekday Special: same day or next weekday	Routine: same day or next weekday Stat or Pre-op: same day Special procedure (IVP, GI, contrast): next weekday; one per weekday if multiple procedure Arteriogram: next day or next weekday
4. Electrocardiogram results will be available for physician review	Next weekday	Next weekday	Same day if ordered in a.m., otherwise next day
5. Electroencephalogram results will be available for physician review	Next weekday	Next weekday	Next day
6. Consults and referrals will be performed and reported	Same day or next weekday	Same day or next weekday	Within 24 hours of request
7. Operative procedures will be performed	First day OR available to service after decision to operate unless consent form delays, medical complication arises, etc.	Next weekday following decision to operate or as scheduled pre-admission unless consent form delays, medical complication arises, etc.	Elective cases (except colon): day following admission Elective colon cases: third day following admission Emergency cases: same day as indicated Non-emergency where surgery not indicated until hospitalized: second weekday following decision to operate
8. Discharge will be carried out	Day ordered by physician	Same as Hospital A	Same as Hospital A

## SUMMARY OF CAUSES OF POTENTIALLY AVOIDABLE HOSPITAL DAYS

### Medical

1. Part or all of treatment could have been as outpatient
2. Physician management
  - a. Delay in ordering something in critical path
  - b. Delay in ordering discharge
3. Consult delay
4. Inadequate pre-admission scheduling
  - a. Of diagnostic workup
  - b. Of OR time

### Administrative

1. Diagnostic radiology delay
  - a. Routine
  - b. Special
2. Nuclear medicine delay
3. Clinical laboratory/pathology delay
  - a. Routine
  - b. Special
4. Surgery delay
  - a. OR preferred time
  - b. OR capacity constraints
5. Nursing home placement delay
  - a. Social service
  - b. Lack of nursing home bed of funding
6. Administrative discharge delay

### Other

1. Patient/family pressure
2. Teaching
3. Research
4. Other (specify)

ADMISSIONS/DISCHARGE  
LIST FOR SAMPLE SELECTION

ILLUSTRATIVE

SAMPLE NUMBER	HOSPITAL ADMISSION/ DISCHARGE	ADMISSION/DISCHARGE CHARACTERISTICS*						
		Normal	Death	Discharge AMA	Renal Dialysis Unit	Detoxification Unit	Normal Delivery	Other
1	54,164	✓						
2	53,976	✓						
3	54,092		✓					
4	And so on ...							
5								
...								
300								

## RECORD REVIEW WORKSHEET

**Sample Number:** 46**Admission/Discharge Number:** 51322**Chief Complaints:** Tenderness, abdomen**Admitting Diagnoses:** Possible urinary tract infection**Final Diagnoses:**

1. Urinary tract infection
2. Otitis media
3. Hemorrhoid

**Age:** 31**Residence:** Cityville, U.S.A.**Date Admitted:** 6/29/77**Service Admitted:** Medicine**Admitting Physician:** Dr. T.**Attending Physician:** Dr. T.**Surgeon:** Dr. T.**Date Discharged:** Home**Length of Stay:** 16d**Insurance Coverage:** Medicaid**Operative Procedures:** Cystogram, cystourethroscopy  
urethral dilatation

DATE	DAY OF WEEK	DAY	COURSE OF TREATMENT	APPARENT DELAYS	IMPACT ON ALOS

### MEDICAL RECORDS ANALYSIS SUMMARY

SAMPLE NUMBER	ADMISSION DISCHARGE NUMBER	CASE DESCRIPTION			CONCLUSIONS											
					TOTAL	NUMBER OF AVOIDABLE INPATIENT DAYS								BY APPARENT CAUSES		
						PATIENT COULD HAVE BEEN DISCHARGED AND/OR TREATED ON AN OUT-PATIENT BASIS	INPATIENT DELAYS ASSOCIATED WITH PHYSICIAN MANAGEMENT OF PATIENTS									
							FAILURE TO CARRY OUT PRE-ADMISSION OR SCHEDULED TESTS	TESTS NOT CARRIED OUT OR CANCELLED	CONSULT OR REFERRAL	X-RAY RESPONSE DELAY						
		PRIMARY DIAGNOSIS	ACTUAL LENGTH OF STAY	CHECK ( / ) IF ADMISSION DETERMINED TO BE UNNECESSARY		TOTALLY	IN PART	Recent Clinic Visit	Admission Seminar	Post Admission Test	Failure to Order	Ordering on Scheduling	Delay in Ordering	DISCHARGE	ROUTINE	SPECIAL
1	10480	CVA with hemiplegia	20		14											
2	22368	Diabetes mellitus	22		2										2	

$x \div y =$  Percent of inpatient days avoidable  
 $(a+b) \div x =$  Percent of avoidable days caused by failure to treat on an outpatient basis

CONCLUSIONS															
NUMBER OF AVOIDABLE INPATIENT DAYS															
BY APPARENT CAUSES															
CLINICAL LAB DELAY				OTHER DIAGNOSTIC SUPPORT DELAY				OPERATING ROOM DELAY DUE TO		NURSING HOME PLACEMENT DELAY DUE TO		DISCHARGE DELAY DUE TO			
ROUTINE	SPECIAL	ECG	EEG	NUCLEAR MEDICINE	PULMONARY FUNCTION	DELAY DUE TO PREFERRED TIME SCHEDULE	O.R. CAPACITY CONSTRAINTS	SOCIAL SERVICE	1	13	ADMINISTRATION	PATIENT OR FAMILY PRESSURE	TEACHING	RESEARCH	OTHER (SPECIFY)

## RECORD REVIEW WORKSHEET

## EXAMPLE 1

Sample Number: 55

Admission/Discharge Number: 10480

Chief Complaints: See Final Dx

Admitting Diagnoses: See Final Dx

**Final Diagnoses:**

1. Cerebrovascular accident with leftside hemiplegia
2. Arteriosclerotic cerebrovascular disease with cerebral ischemia
3. Diabetes mellitus

**Operative Procedures:** None

Age: 71

Residence: Townville, U. S. A.

Date Admitted: 1/28/76

Service Admitted: Medicine

Admitting Physician: Dr. T

Attending Physician: Dr. T

Surgeon: None

Date Discharged: 2/17/76

Discharged To: Pinewood Chronic Hospital

Length of Stay: 20d

Insurance Coverage: Medicare

DATE	DAY OF WEEK	DAY	COURSE OF TREATMENT	APPARENT DELAYS	IMPACT ON ALOS
1/28	W	1	CXR ORD/RTD Skull X-R ORD/RTD CBC, FBS, BUN — Physical Therapy Social Service - ORD EKG - ORD/RTD		
1/29	Th	2	Brain Scan ORD/RTD Consult Dr. A. — FBS 7. d. CBC, FBS, BUN RTD —		
1/30	F	3	PT Consult RTD & Therapy begun — Social Service RTD - Form 256R initiated — FBS, LYTES, ALK Phosph, Cholest Tri Gly, Albumin, Globulin ORD/RTD Consult Dr. A. RTD —	1d delay-physical therapy response 1d delay-SS answer request	0d impact 1d placement delay-SS
1/31	Sa	4	MD. Notes: Patient to be up	Physician advisor feels maximum hospital benefit on approx. 2/1	
2/2	M	6	Form 256R — Health Dept.		
2/4	W	8	SS note: awaiting bed	13d awaiting bed	13d placement delay - Lack of bed
2/10	Tu	14	Notification — bed available 2/17		
2/17	Tu	21	Trans to Pinewood "Continue PT"		
Notes:				Total	14d
<ol style="list-style-type: none"> <li>1. No real change in FBS regardless of insulin dosage</li> <li>2. Patient made minimal progress in hospital</li> <li>3. Have Physician Advisor determine maximum hospital benefit</li> </ol>					

## RECORD REVIEW WORKSHEET

EXHIBIT 8

## EXAMPLE 2

Sample Number: 22  
 Admission/Discharge Number: 22368  
 Chief Complaints: —  
 Admitting Diagnoses: Diabetes mellitus, ASCVD,  
 Organic brain syndrome, Osteoarthritis  
 Final Diagnoses: Diabetes mellitus  
 Peripheral neuropathy and neuritis 2<sup>o</sup> to Dx #1  
 Cerebral arteriosclerosis w/Organic brain syndrome  
 Mixed arthritis  
 Operative Procedures: None

Age: 70  
 Residence: Big City, U.S.A.  
 Date Admitted: 5/21/76  
 Service Admitted: Medicine  
 Admitting Physician: Dr. F.  
 Attending Physician: Dr. F.  
 Surgeon: None  
 Date Discharged: 6/12/76  
 Discharged To: Home  
 Length of Stay: 22d  
 Insurance Coverage: Medicare

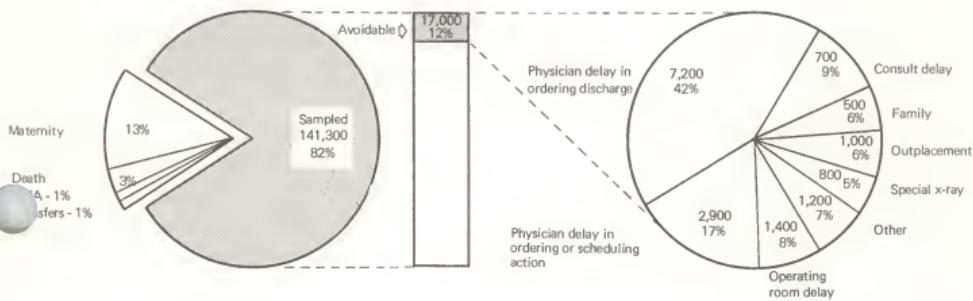
DATE	DAY OF WEEK	DAY	COURSE OF TREATMENT	APPARENT DELAYS	IMPACT ON ALOS
5/21	F	1	FBS daily rtd CXR - ord/rtd EKG - ord/rtd Electrolytes ord Ca, P, Alk Phosphatase, SGOT, SGPT, CPK, Cholesterol, A/G ord	BS Pt hallucinating	
5/22	Sa	2	Bld series rtd Electrolytes rtd		
5/23	Su	3	Flat plate ABD ord		
5/24	M	4	Flat plate ABD rtd GI and GB series ord/rtd		
			Pt confused, disoriented, BS still ↑, intake poor		
6/1	Tu	12	L-S spine XR ord Consult Dr. C. ord	Cooperative, alert	
6/2	W	13	Dietary instructions L-S spine XR rtd	C/O leg pain	2d delay consult
6/4	F	15	Consult Dr. C. rtd		No impact because BS still out of control
6/5	Sa	15	Soft L-S binder	BS stabilizing	3d delay ord PT
6/6	Sun	17			No impact because BS still out of control
6/7	M	18	PT and exercises - ord/rtd		
6/8	Tu	19	↓ Tolinase		
6/9	W	20	↓ Tolinase		
6/10	Th	21			
6/11	F	22			
6/12	Sa	23	D/C		
Physician advisor feels Day 21 D/C appropriate					2d physician discharge delay
TOTAL					2d

**RESULTS OF RECORDS ANALYSIS**  
Hospital A

**TOTAL PATIENT DAYS**  
(January-December 1976)  
172,305 days = 100%

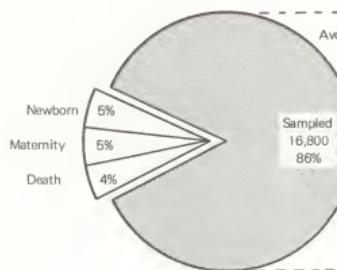
**AVOIDABLE DAYS**  
IN DAYS SAMPLED  
141,300 days = 100%

**AVOIDABLE DAYS BY CAUSE**  
17,000 days = 100%



**RESULTS OF RECORDS ANALYSIS**  
Hospital B

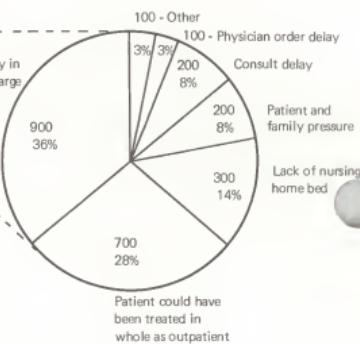
**TOTAL PATIENT DAYS**  
(Dec. 1975-Nov. 1976)  
19,442 days = 100%



**AVOIDABLE DAYS IN DAYS SAMPLED**  
16,800 days = 100%



**AVOIDABLE DAYS BY CAUSE**  
2,500 days = 100%

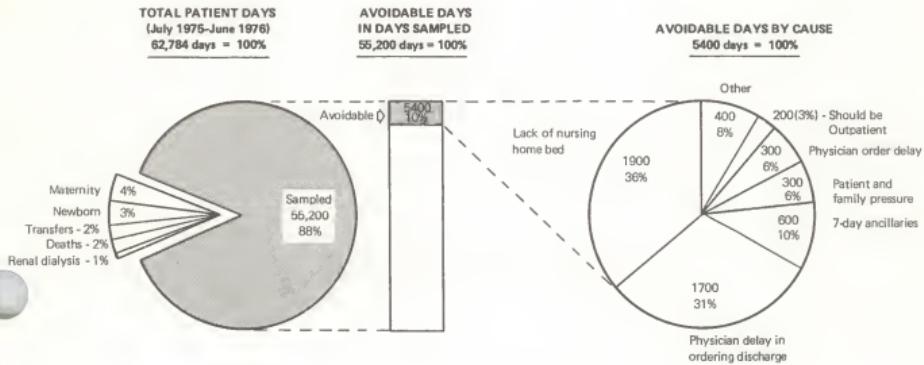


RESULTS OF RECORDS ANALYSIS  
Hospital C

**TOTAL PATIENT DAYS**  
(July 1975-June 1976)  
62,784 days = 100%

**AVOIDABLE DAYS  
IN DAYS SAMPLED**  
55,200 days = 100%

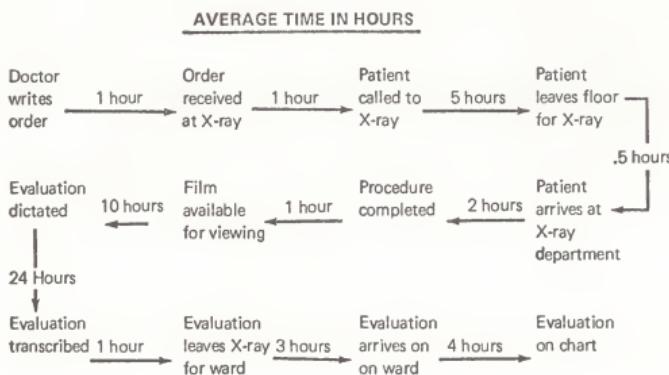
**AVOIDABLE DAYS BY CAUSE**  
5400 days = 100%



## ILLUSTRATIVE

## ROUTINE INPATIENT X-RAY PROCESS

## FURTHER STUDY ON REASONS FOR DELAYS



## HOSPITAL CORRECTIVE ACTION PLAN

(Illustrative — Based on Actions Developed in Test Hospitals)

Major Problem Area	Underlying Cause	Planned Steps	Deadline	Responsibility	Potential Resources Saved (Required)		
					One Time	Annually	Comments
1. Patients could have been treated as outpatients	Outpatient clinic staff capacity inadequate on evenings and weekends	a. Add 1.0 fte RN and 0.5 clerical position  b. Assign one extra resident to cover outpatient clinic on evening and weekends (27 hours per week)	7/1/77  7/1/77	Director, OP Dept.  Chief of Medicine	0  0	(\$20,000)  ( 6,000)	Saves 1,000 patient days (freeing 3 beds)
2. Physician case management delays	Ten physicians kept patients more than 50 percent longer than PAS median on average and accounted disproportionately for physician management delays in 200-case sample	a. Interview 10 physicians to explain findings and need for more stringent review  b. Double frequency of concurrent review for these 10 physicians for 6 months, then repeat profile analysis on these 10 physicians	7/15/77  7/30/77	Physician Advisor and Chairman of Utilization Review Committee  Records review coordinator	0  0	0  ( 5,000)	Saves 1,500 patient days if half of "LOS gap" for 10 physicians closed in first year (freeing 4 beds)
3. Nursing home placement delay	To few Medicaid beds in community	a. Support Certificate of Need Application of Smith Nursing Home if 7 beds set aside for this hospital's Medicaid referrals  b. Support increase in state-mandated Medicaid per diem rates	8/12/77+  9/15/77+	Hospital Director  PSRO Executive Director	0  0	0  0	If Smith carries out, could save 2,500 patient days (freeing 7 hospital beds)
4. Superfluous 30-bed nursing unit in old wing and need for space for non-patient functions, e.g. nursing administration, accounting	Eliminating 2,500 patient days by corrective actions listed above cuts average daily census by 7 patients; 23 other beds can be closed without raising medical and surgical occupancy above 88%	a. Close 30-bed unit transferring patients and staff to other units and freeing space for non-patient functions  b. Eliminate 7 positions and \$60,000 in annual payroll and benefit expense through attrition, as follows: 2 ward clerks 2 housekeepers 1 tray carrier 1 supply deliverer 1 kitchen aide  c. Eliminate \$15,000 in annual food and medical supplies cost  d. Re-allocate \$15,000 in annual utility, repair, and building depreciation expense from nursing unit to non-patient cost centers	10/30/77  10/30/77  10/30/77  10/30/77	Director, Nursing Services  Hospital Director  Hospital Director  Controller	0  0  0	0  60,000  15,000  25,000	Made possible by actions to eliminate avoidable days described in 1 and 2 above

Potential Net Savings

\$69,000

25. *Microtus amoenus* (L.)  
with original title and  
the author's signature

26. *Microtus amoenus* (L.)  
with original title and  
the author's signature

APPENDIX

## APPENDIX

### STATISTICAL CONSIDERATIONS IN SELECTING A SAMPLE OF CASES FOR REVIEW

This appendix supplements the brief discussion of sample size and case selection presented in Chapter II, Sections 4 and 5, of the main body of this document.

#### SAMPLE SIZE

The number of cases needed to be analyzed in carrying out CLTR is dependent on two countervailing considerations. The more cases which are analyzed, the more confident one can be in the statistical validity of the findings; but the more time-consuming will be the CLTR process. The CLTR demonstration project has indicated that a 200-case sample offers a reasonable balance between statistical validity and resource economy.

There is a direct relationship between sample size and the statistical validity of findings based on analysis of the sample. Statisticians have determined that one can be 90 percent confident that the percentage of avoidable days (p) estimated from an n-case sample is within e percentage points of the true avoidable days percentage for all cases from which the sample was drawn, where  $e = 1.645 \sqrt{p(100 - p)/n}$ .\* The two examples which follow illustrate how this relationship can be useful to the user of CLTR.

Example 1: With a sample of 200 records - the number used in previous demonstrations of the CLTR methodology - we can be confident that an estimate of 10 percent of days being avoidable is within 3.5 percentage points of the true percentage of avoidable days for all of that hospital's cases from which the sample was drawn, since  
 $e = 1.645 \sqrt{10(100 - 10)/200} = 3.5$ . Exhibit A - 1 portrays graphically the relationship between sample size and 90 percent confidence limits for various estimates of the percentage of avoidable days.

---

\* - Derived from the sample size estimation function for binomial parameters.

Example 2: If analysis of the 200-case sample indicates that only 2 percent of total sample days are avoidable because of problems with nursing home placement, we can be 90 percent confident that the true percentage of days avoidable for that reason among the cases from which the sample was drawn lies between 0.4 percent and 3.6 percent. Since  $e = 1.645 \sqrt{2 (100-2)/200} = 1.6$  and  $2 \pm 1.6$  is 0.4 or 3.6. Exhibit A - 2 graphs the spread of likely true avoidable day percentages for various estimates based on a review of 200 cases.

As long as the number of cases in the sample is less than 5 percent of the cases from which the sample is drawn, the relationship between likely estimation error and sample size described above is unaffected by the number of cases from which the sample is drawn. Thus, a 200-case sample is just as valid a representation of what has transpired over a year in a hospital which had 4,000 discharges (about 75 beds) as in one which had 40,000 cases (about 750 beds). Even smaller hospitals than those with 4,000 annual discharges can be analyzed by examining 200 cases if the sample is drawn from more than 1 year's discharges.

Since the principal value of CLTR is in determining which hospitals have major opportunities to avoid unnecessary hospitalization and to identify the two or three most significant causes of avoidable days, it is not necessary to achieve single-percentage-point precision in estimating avoidable-days percentages. It would certainly not be economical to do so. For the range of total avoidable-day percentages likely to be found in most community hospitals - perhaps 5 to 15 percent - a sample size of 200 is sensible. With 200 cases, a 10 percent estimate is within 3.5 points of the true value (Exhibit A - 2). To cut the margin of error in estimating an avoidable-days percentage of 10 percent from 3.5 percentage points for 200 cases to 2 percentage points would require analysis of an additional 135 cases, and a 1,730-case sample would be required to ensure that a 10 percent estimate was within 1 percentage point of the true value. The recent test suggests that the additional time and cost involved in reviewing these larger samples would not be justified by enhanced accuracy or credibility in the results.

## CASE SELECTION

Selecting the initial list of the 300 admissions or discharges needed to ensure a representative sample, and narrowing that list down to a final sample of about 200 records, is a critical step in the CLTR process. The records analyst should work from a comprehensive list of admissions or discharges for the designated sample period. Where the analyst has a choice of either an admissions or discharges list, the discharges list is preferred to ensure that all cases listed have been completed at the time of the selection. The list used must indicate the medical record number for each case, or some other information, e.g., patient name, from which the medical record describing the case episode can be identified.

The cases in the comprehensive list will often be numbered consecutively; if they are not, the records analyst should number them consecutively beginning with 1 - or at least be able to determine which number each case would have if they were so numbered. For example, if the discharge list is initially not numbered consecutively, the records analyst should count the cases in the list, writing the "count" at every tenth case next to it on the listing. If the cases are initially numbered consecutively, but simply do not begin with 1, the analyst need not count the cases at all. Rather, he can assign to each case the new number equal to its old number plus 1 minus the lowest old number in the list. Thus, a case list numbered consecutively from 49,606 to 57,403 would be assigned new numbers from 1 to  $57,403 + 1 - 49,606 = 7,798$ .

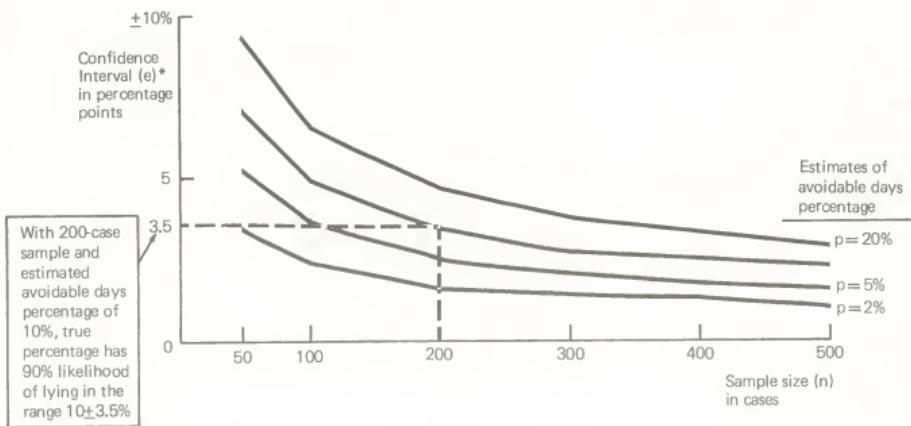
Once the comprehensive list of cases for the period to be sampled is numbered consecutively, the records analyst should acquire a sample of 300 records from the list in either of two ways: (1) by generating one on a computer for the range of numbers spanned by the comprehensive list of admissions or discharges or (2) by generating one manually from a printed random number table. If the hospital or PSRO has access to a time-sharing computer system, the computer-run table is easily generated through consultation with the user's manual or service representative. In the case of a discharge list which initially is numbered consecutively but does not begin with one, it is often possible to generate by computer a random number table for the initial span of numbers

(49,606 to 57,403 in the example above) without renumbering the list beginning with 1.

If computer generation of a suitable random number table is not feasible, the records analyst should refer to the random number table in Exhibit A - 3 or some other found in a statistics textbook. First, the analyst should count the digits in the number of the last discharge in the list. If there were 24,000 discharges in the list, they would be numbered 1 to 24,000, and the number of digits in the last number (24,000) would be 5. Next, the analyst should draw vertical lines separating the random number table into columns of as many digits as there were digits in the number of the last discharge listed. Once this is done, the analyst should scan each column of the table, drawing boxes around the first 300 numbers in the table which are encompassed by the numbers of cases in the discharge list. For example, for the 24,000-case example described above, the first three cases taken from the random number table in Exhibit A - 3 would be 10,480, 22,368 and 9,429 - the first numbers in the random table falling within the range of 1-24,000.

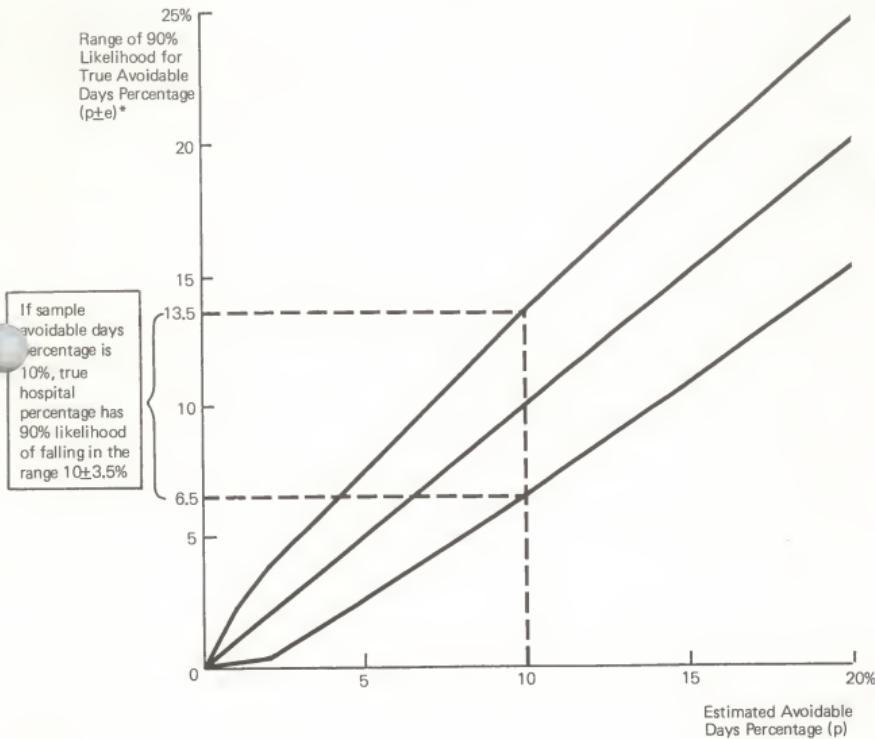
The initial sample of 300 cases should be reduced to 200 following the procedures described in the body of this document.

### SIZE OF CONFIDENCE INTERVAL vs. SAMPLE SIZE FOR VARIOUS AVOIDABLE DAYS PERCENTAGES



\*  $e_{90} = 1.645 \sqrt{p(100-p)/n}$ , where  $p$  is the estimated percentage of avoidable days,  $n$  is the number of cases in the sample, and  $p \pm e_{90}$  is the range in which there is a 90% probability that the true percentage of avoidable days lies.

SIZE OF CONFIDENCE INTERVAL OVER RANGE OF AVOIDABLE  
DAYS PERCENTAGES FOR A 200-CASE SAMPLE



\*  $e_{90} = 1.645 \sqrt{p(100-p)/n}$ , where  $p$  is the estimated percentage of avoidable days,  $n$  is the number of cases in the sample, and  $p \pm e_{90}$  is the range in which there is a 90% probability that the true percentage of avoidable days lies.

## RANDOM NUMBER TABLE

10490	15011015360201	181647916466917914194625903620720969995709129190700
223168	465732559585393	330995891982798253402939653409552666191743961599505
241304	483602252797265763936	4809151792483049340320813068019555633485829
4216793093062436168007856163763944053537713415700400849749179775816379		
3757039975818371665606121917826046881305496846067214110069270126354613		
7792106907110084275	12775653498186027065990655150532191681254439442M80	
9956272905564206999498872310167119418738440134884063213210691063412952		
9631919770546307972188762092945955669690146004518425849034250833037		
895791434263661102811745318103577408437825331256658678449470558556941		
854753685753342539885306595333886762300651581798316439114581859364952		
2891869578882313327670997799365686505859901063159501547855909161078188		
6355340961482350342749626694451866372695521802084712234905113370390322		
0942991939695263692737889743486836320176173C0150287284115271563061374952		
1036561129875298568948237522676768993394015112635885104202852997589168		
07119973367104808178772331319164756481056977358597729372744612855190707		
5108512765518215125977452163086075692144494425390070960639907560140719		
02368213825240460268893681986553224419011886255644835449190594455317		
0101154092336329490431273014161859429852715858503051132019159274764951		
52162539164636955H623216145138314998736234956435094738177523515635749		
07056976283787099842698066917698813620518514610488916195092562558104		
4863391245858281434609172301689022904734591932817830421616669990432M18		
5416458492224217410347070253067468263284581510664621524152479699044552		
32639323630559724200133633805095434282072835806069121701264161829622P51		
29334270018673678730085873100256458341539843557411351036707683618185510		
02468330628883407351197319242060952612805001676583258683266795072094953		
8152572295048399642324878826516656614778767971478013300870747966695725		
29676205916808626432469012084989768815368664512659225957120842825280		
00742573923906466432846734002732832136294974960674764765489460969598253		
05366042132566926122440744048379376390445766613475470665403469390449		
919512641864117943052676625940399722209715006456891402424160784469618		
0058204711879177734142206351267408799547818174260743808766556202876630		
00725698846279756170863248807276223608684637931617603865537791988006		
69011657959587653931989827354265750825408015992029841801501277748501		
2597657948288888604679174870818912822716542469774361542628596303547		
09763834737357713908383181217282903579705998416883495237883891788050		
9156742595279583023404024863852988099730555368485529080092507965673211		
1795556349909994918720044599310611520542180590200873708835173610342791		
46503185848184849618023045103820655587272816815475756948533692056287338		
9215786349484247847184610828340992225417441374841325555212433550920468		
1457762767653608146339667473528568735630761607495188965620137749018064		
9842707523333626457001638924776696998420048804558546565041024688045709		
3491463976887088065344761703285892036324287701270663886377756934		
7060262827739475468732321953416949702583269975944196617244R0010266794		
537654914060672456835082948113984287880287826747363461340654197H09		
76072295154080071915874525774229870053999119618941151142226069759583		
90725522108397429992658313886575049083765556571436131720573755622241546		
6436467412333393192614883844135974492319747389364856891693524837345578754781788		
089620035831668253086162834072812493564856891693524837345578754781788		
95012883799552867076510592045427646354328023491724728865147776273092277		
1566410493204923633919113221999595168165227195482346751282933226185653		



CMS LIBRARY



3 8095 00014899 5